GOVERNMENT OF MADRAS.

REVENUE DEPARTMENT.

READ—the following letter from Dr. A. G. BOURNE, F.R.S., to the Secretary to Government, Revenue Department, dated 28th February 1898:—

I arrived at Cocanada on Monday 21st and spent the 22nd—25th in examining the sugar-cane. I returned by steamer this morning and submit a report at once, as if anything can be done it should be done quickly. I have, in anticipation of the approval of Government, informed the Collector and some members of the Chamber of Commerce that the ryots should be induced by all possible means to root up the old stools, to burn all litter, to examine "tops" before planting and to plant only on land where paddy was last year.

The cutting and crushing is now going on and new planting will begin by the next new moon.

I think it would be desirable if Government were to call for a report as to the extent of the disease in all cane-growing districts. In such an enquiry it would, I think, be sufficient to ask whether any of the canes exhibited red spots or patches *in their flesh*. The ryots would have noticed such at the time of crushing. The damage done in the eastern delta at any rate is very great; from the forward crops which have been crushed, only half the usual yield of jaggory has been obtained while from many still standing, much less will be obtained.

ENCLOSURE.

Sugar-cane disease in the Godavari Deltas and neighbourhood.

1. *Introduction.*—My attention was drawn to this matter by letters from the Collector of the district and from Messrs. Wilson & Co. of Madras.

Numbers of canes in certain localities were reported to be withering and the evil was generally ascribed to the ravages of some insects.

A great variety of insects were sent to me, some prefectly harmless to the canes, others undoubtedly capable of doing damage. I do not propose to deal with these here as the total damage done by them in the gardens I have examined is infinitesimal as compared with that done by a fungoid growth.

This growth produces all the symptoms characteristic of an attack by *Trichosphæria sacchari, Massee.*

This is the fungus which has recently threatened to extinguish the sugar industry in Barbados. Different stages in its life history have been known as the "root fungus," and "rind fungus," respectively. I find both stages present and great damage is being done and unless some measures to check the progress of the disease are adopted at once matters will go from bad to worse.

Mr. Maxwell of Messrs. Wilson & Co. kindly secured me the services of several gumastas and we visited a great number of "gardens"—as the sugar-cane plantations are there called—and interviewed the ryots. All the gardens we examined, among which were several reported to be quite healthy, showed much disease and now that I have pointed out what the symptoms realy are, I gather from what I have been told that the disease is pretty widely spread along the whole coast, perhaps, even to Ganjam, and that it is no new thing this year but has been gradually coming on for some years. It is, however, only this year that the results have been sufficiently marked to cause it to have been brought to the notice of the Collector and Chamber of Commerce. It has evidently now taken a thorough hold of this district and is likely in my opinion to be infinitely worse next year unless prompt and concerted measures are taken to check it.

2. *Symptoms.*—Canes but slightly affected, *i.e.*, only recently attacked, show no external signs of disease, but transverse sections show one or more bright red spots in one or more internodes and if these are followed up by longitudinal sections

they appear as red streaks which branch at the nodes. It is the fibro-vascular bundles which become coloured. Such slight attacks usually occur somewhere about the middle of the length of the cane. Where the disease is more advanced the colouration extends also to the ground tissue so that any section shows red patches. Subsequently the central portion of each red patch becomes opaque and white and acquires a texture like that of a "woolly" radish, the tissue is in fact dead. Where the disease is still further advanced, portions first at the nodes and later elsewhere, become black and at this stage or before, the leaves at the top wither, and the entire cane dies up. Some of the canes only, were attacked when sufficiently young to give time for the disease to run its full course, others were attacked at later stages and are yielding a certain amount of juice. Wherever the fungus has been growing in the cane for a sufficient length of time small black, minutely velvetty spots are to be found among the sleeping roots which look like warts on the nodes. These spots are groups of myriads of spores ready to be distributed by the wind.

Each garden which I examined showed the disease in all its stages, contained in fact plants which had been attacked at different periods.

3. *Methods adopted by the ryots which bear upon the spread of the disease.*—The only crop raised in rotation with sugar-cane by most of these ryots is paddy and it appears to be the general custom to keep a particular plot as a sugar-cane garden for two years, to plant paddy in the third year and then revert to sugar-cane. The sugar-cane crop of the first year is raised by planting "tops." Before the canes are passed through the crushing mill the upper portion with the leaves is cut off, this when trimmed constitutes a "top." The "tops" are put together in a heep loosely covered up with leaves and are planted out after about four or five weeks so that they remain exposed to any spores which may be about in the air for a considerable time; during this some of them are doubtless attacked.

If sufficient "tops" are not available any joint, *i.e.*, any internode with a couple of nodes showing buds is used.

The land from which paddy has been recently harvested is ploughed, dry if possible, after soaking if necessary. The "tops" are laid out in rows, trampled in, and after sprouting has begun furrows are made and irrigation commences. The second year crop is raised by ratooning, *i.e.*, the stools of the previous crop are left in the ground and new shoots grow from them. If a second-year crop has been very good a third-year crop is sometimes attempted in the same way but this does not appear to be the custom, nor, apart altogether from this disease, do the ryots seem to expect a third-year crop to be a good one, the canes they say are likely to be thin and without much juice. This ratooning seems, under ordinary circumstances, to give very good results for one year. I may, however, at once point out that where this disease is present to attempt a second-year crop by this method is not only absolutely suicidal but helps to spread the disease. Almost all the second-year crops now being cut are worse than the first-year ones and the stools which are now being left to sprout are I find almost all infected so that next year's crops grown from them are almost sure to be complete failures. I expect the shoots, infected as they will be from the very first, will soon wither.

In most gardens a certain number of canes are cut from day to day and sold for "chewing" and fetch about 2 pies each at the garden. The "chewing" season lasts from about January to March. When the bulk of the canes is ripe a mill is erected in nearly every garden, the cutting commences in earnest and the crushing goes on day and night, on some gardens at any rate. About ten coolies and six pairs of buffaloes are employed at each mill. The leaves are given to the buffaloes, the "tops" are put aside as described above, the crushed stems are spread out upon the ground to dry and when dry are used as fuel for the boiling which takes place on the spot. The ash and scum are used as manure and any fuel unused is stacked. At all the mills I visited the procedure was identical.

4. *The way in which the disease is spread.*—This disease is actually caused by the fungus. Insects may damage some of the canes, the quality of the water, the use of unsuitable manure, or the exhaustion of the soil may cause a weak crop; but it must be clearly understood that if spores of this fungus enter its tissues the strongest and healthiest cane will be attacked. It is the spread of the spores of the fungus which we must endeavour to check, and unless this is done no other measures are likely to have any beneficial result.

The spores are extremely minute and occur in inconceivable numbers in the little black patches on the surface as well as inside the tissues of every diseased cane. They are capable of being dried up without losing their vitality and in this condition are blown about by the wind. There is no doubt but that in an infected area spores are constantly settling everywhere in the form of impalpable dust particles. We have thus to deal with a most insidious foe. The greater portion of the surface of the cane is protected by a hard cuticle but the spores easily effect an entry at the broken leaf bases and the attack usually commences here. They also enter at any spot where the surface is injured or at a hole made by a boring insect or at a crack crused by exposure to sun or dry wind. Where the fungus exists in a stool or in a planted "top" it will assuredly grow into the young plant which shoots up thence. It is evident that some of the methods adopted by the ryot are calculated to spread the spores as widely as possible, and his method of planting and more especially of raising a second crop where the di-ease is prevalent are almost certain to ensure its recrudescence in an aggravated form.

5. *Measures which should be adopted.*—All land which has been under sugarcane this year should be sown with paddy, all cane roots which have been left in the ground wherever there has been any disease being taken up and burnt.

All the crushed cane and old leaves, and other litter should be burnt at once and none stacked for future use. This can easily be done now while the boiling is going on. The ash will be quite harmless and a most valuable manure.

The best plan to adopt where new gardens are being planted would be to secure "tops" from a perfectly healthy area, but this will not, I think, be feasible this year. The "tops" now at the gardens will have to be used but they should be carefully examined by cutting across at each end, and any showing red spots in the flesh scrupulously rejected and burnt.

Next year it will be necessary to consider the feasibility of importing seed or taking other measures, but it is now too late to do so this year.

MADRAS, 28th February 1898. (Signed) A. G. BOURNE.

ORDER—No. 127, Revenue, dated 3rd March 1898.

Miscellaneous.

Communicated to the Board of Revenue.

2. The Collectors of Godavari, Vizagapatam and Ganjam should be at once instructed to use every possible endeavour to induce the ryots to adopt the precautions mentioned by Dr. Bourne. The Collector of Godavari should report in what taluks the disease has been observed and the Collectors of all other cane-growing districts should ascertain and report whether the red spots and patches spoken of by Dr. Bourne, have ever been noticed when the cane has been cut or crushed. Wherever this has occurred, the precautions advised by Dr. Bourne should be pressed upon the ryots.

3. The Board should consider, with reference to the suggestion in paragraph 5 of the report, whether arrangements cannot be made for importing healthy "tops" for the use of ryots in infected areas.

(True Extract.)

(Signed) G. S. FORBES,
Ag. Secretary to Government.

To the Board of Revenue (Revenue Settlement, Land Records and Agriculture).
Copy to Dr. Bourne, F.R.S.

Endorsement No. 127 A.

Copy to the Government of India, Revenue and Agricultural Department.

(Signed) N. E. MARJORIBANKS,
Ag. Under Secretary to Government.